

# Overview of State and Local Air Quality Needs and Requirements to Reduce Emissions at Marine Ports



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South Coast Air Quality Management District

National and State Roles in Pursuing Change  
MARAD Workshop on Maritime Energy and Clean Emissions  
Washington, D.C.  
January 29-30, 2002

# Since 1950s

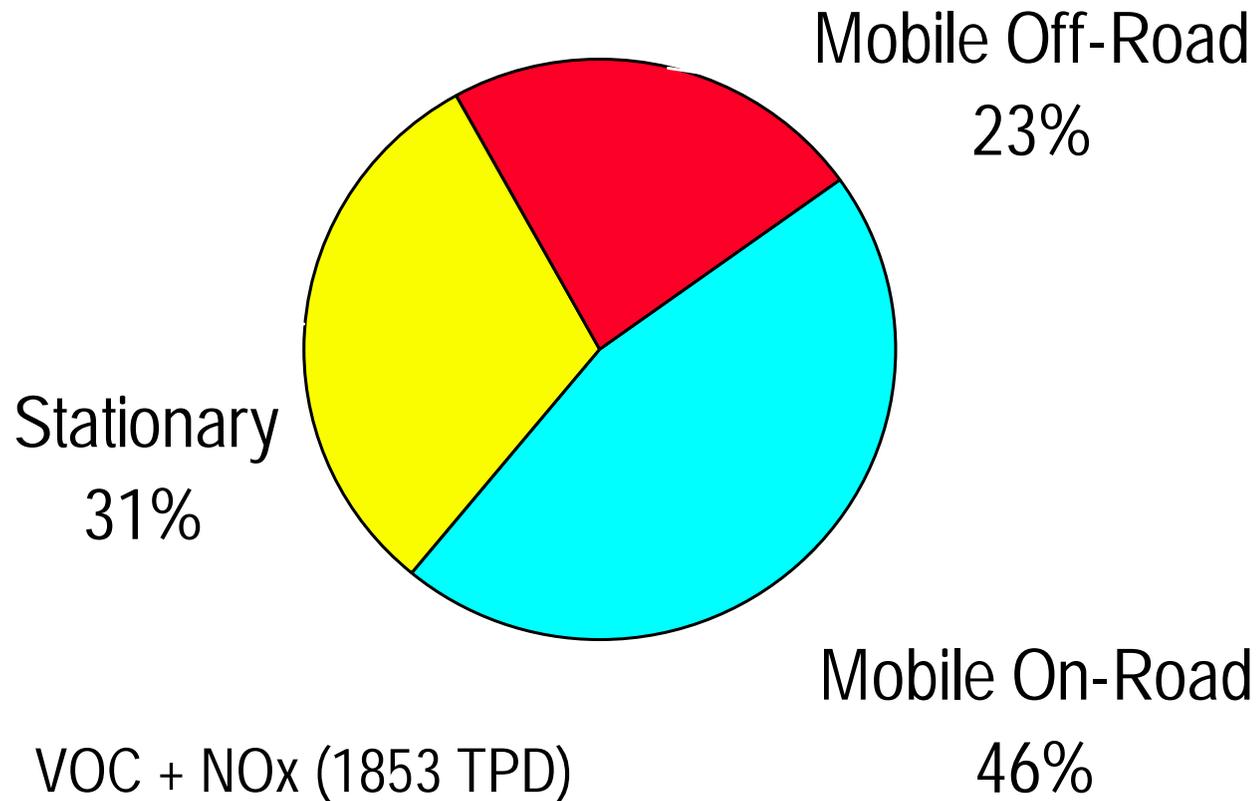
- Population -
  - 4.8 Million  15 Million
- Vehicles -
  - 2.3 Million  10.6 Million
- Peak Ozone Levels -
  - 0.68 ppm  0.19 ppm



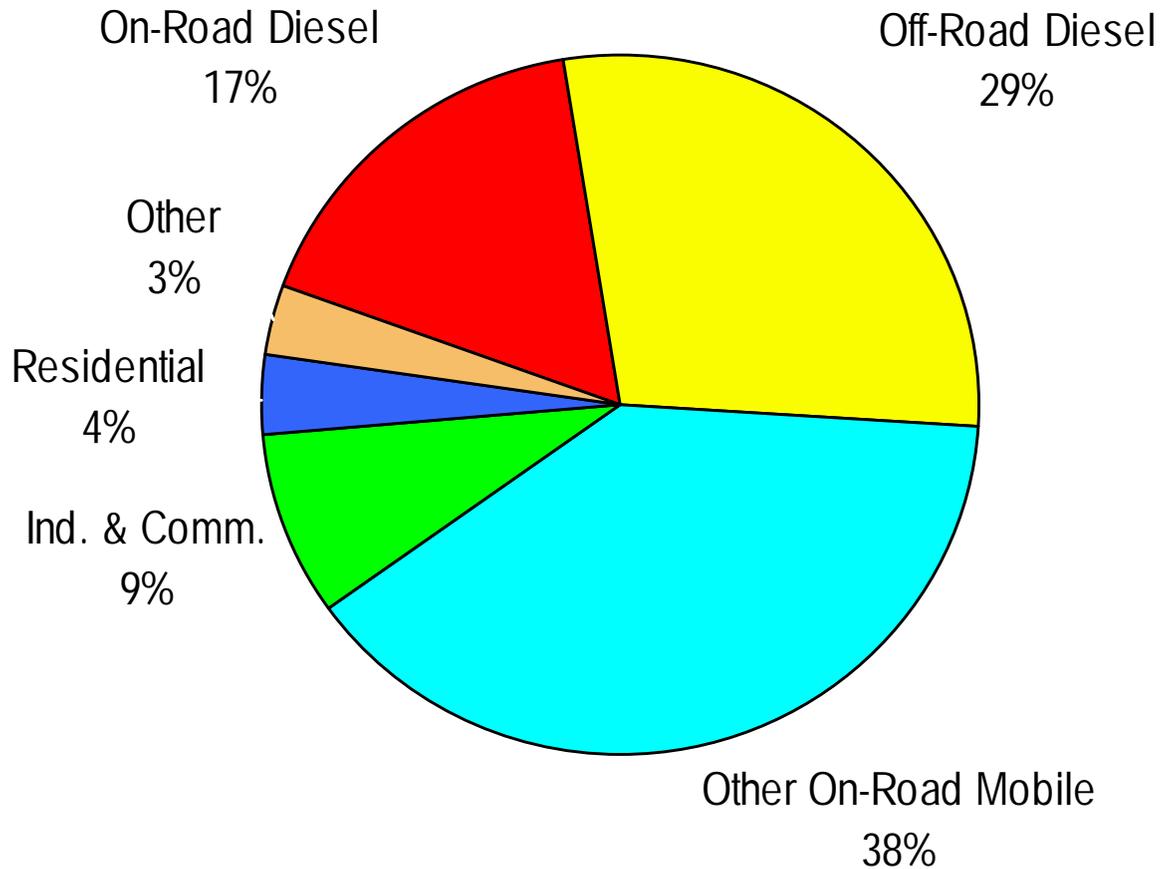
# Ambient Air Quality Standards

- Federal:
  - CO - 2000
  - PM10 - 2006
  - 1-Hr Ozone - 2010
  - PM2.5 - ?
  - 8-Hr Ozone - ?
- State:
  - As Early As Practicable
  - Ozone Plans - 2003

# Ozone Related Emissions in the South Coast Air Basin

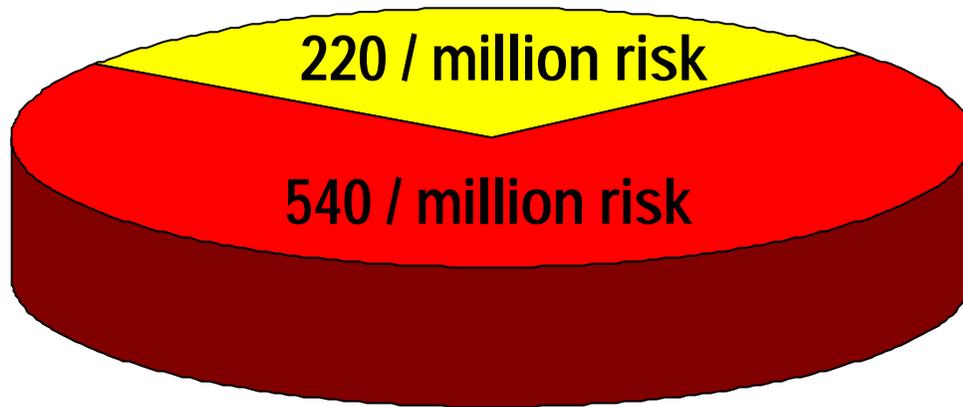


# 1999 AQMP Estimated NOx Emissions



NOx (960 TPD)

# Statewide Estimated Air Toxics Risk



■ Diesel Exhaust PM10 (70%)

■ 1,3 Butadiene (10%)

Benzene (8%)

Carbon Tetrachloride (4%)

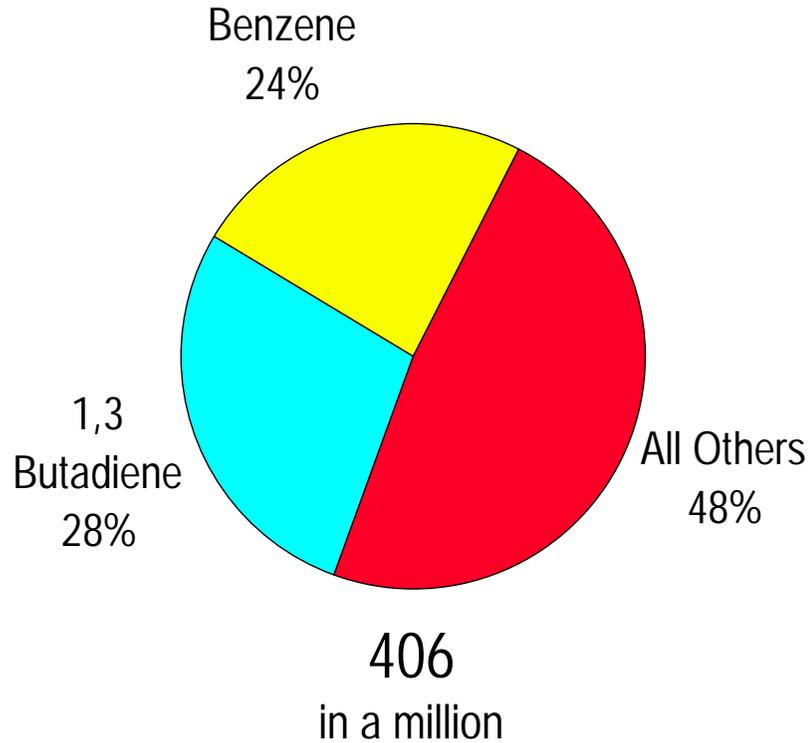
Formaldehyde (3%)

Hexavalent Chromium (2%)

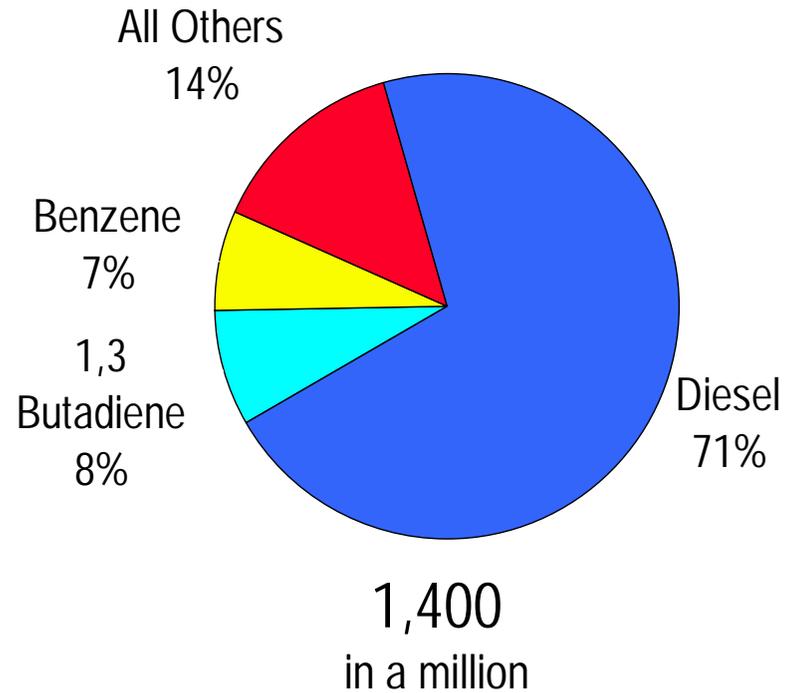
All Others (3%)

# Cumulative Toxic Risk South Coast Air Basin (1998-1999)

## Without Diesel

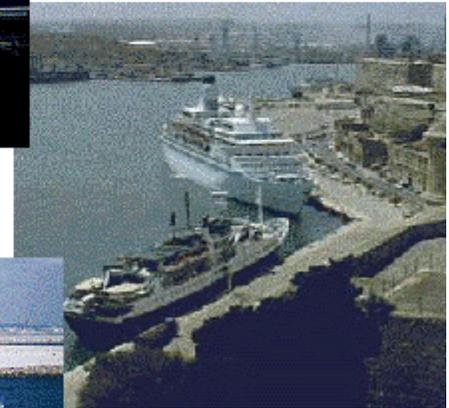


## With CA Diesel Toxicity



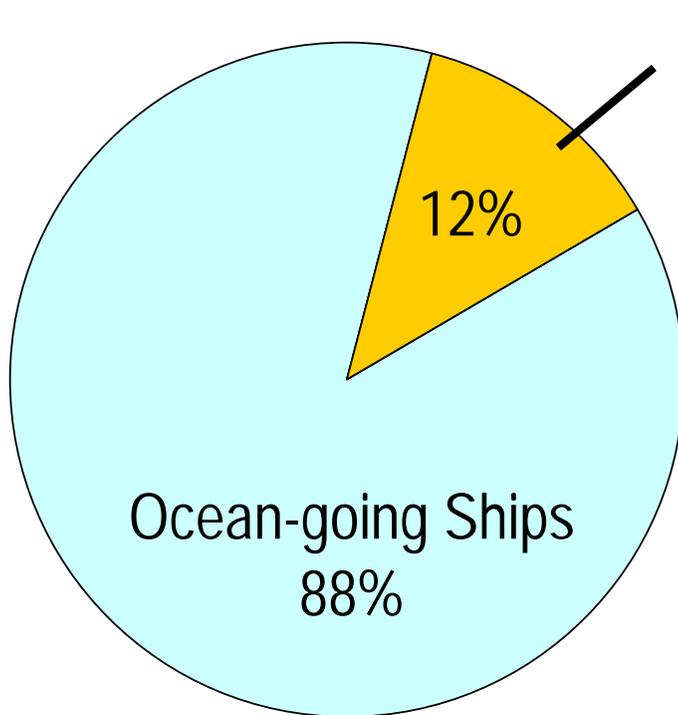
# Emission Sources at Ports: Marine Vessels

- Ocean-going Vessels  
(Container Ships, Tankers, Cruise Ships, etc.)
- Harbor Craft  
(Ferries, Tugboats, Commercial Fishing, Coast Guard, etc.)



# Ocean-going Ships and Harbor Craft

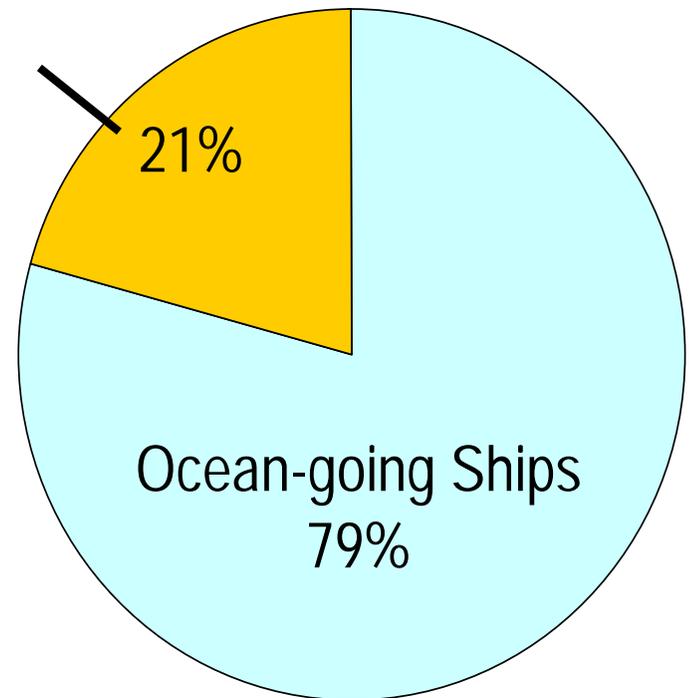
Year 2000 Statewide Diesel PM and NO<sub>x</sub> Emissions



Diesel PM

9 TPD Total

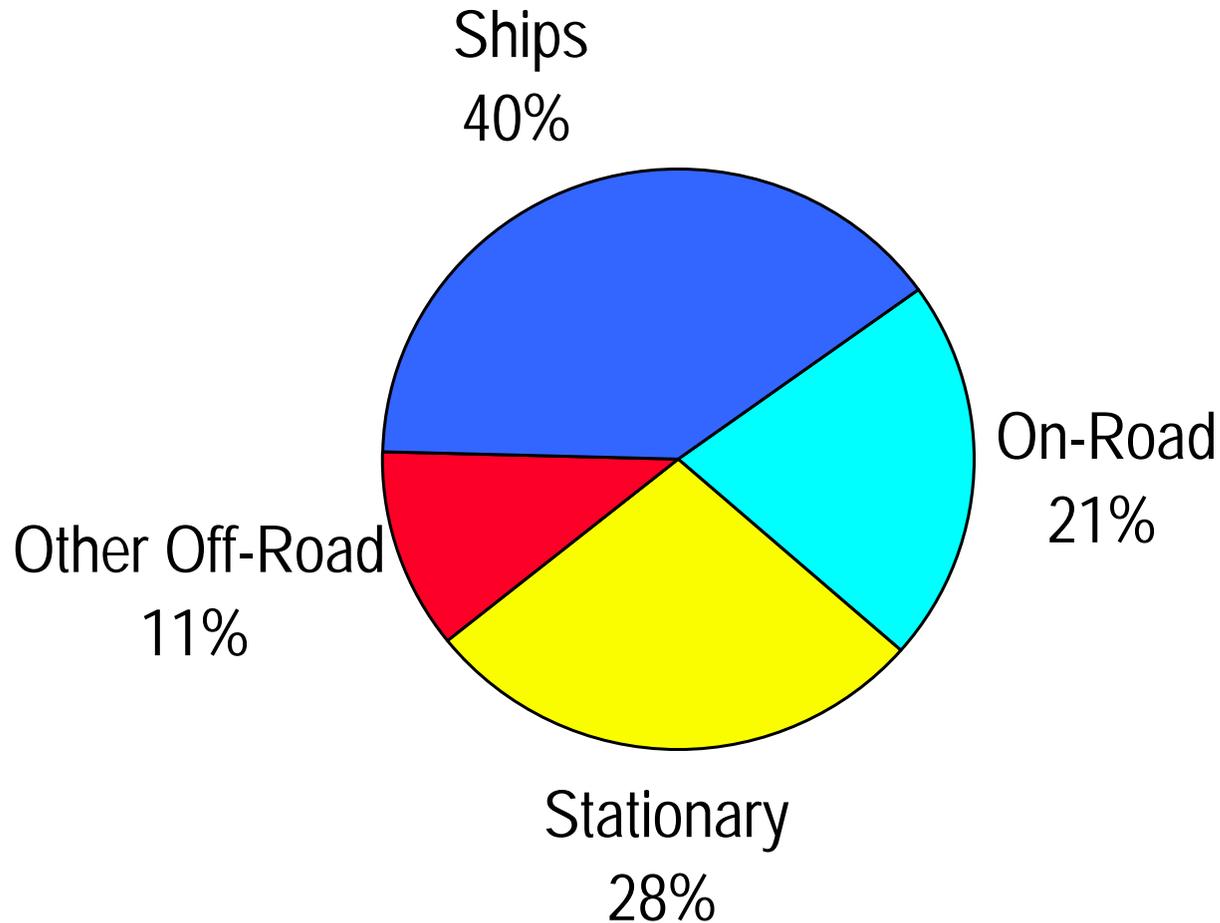
Harbor Craft



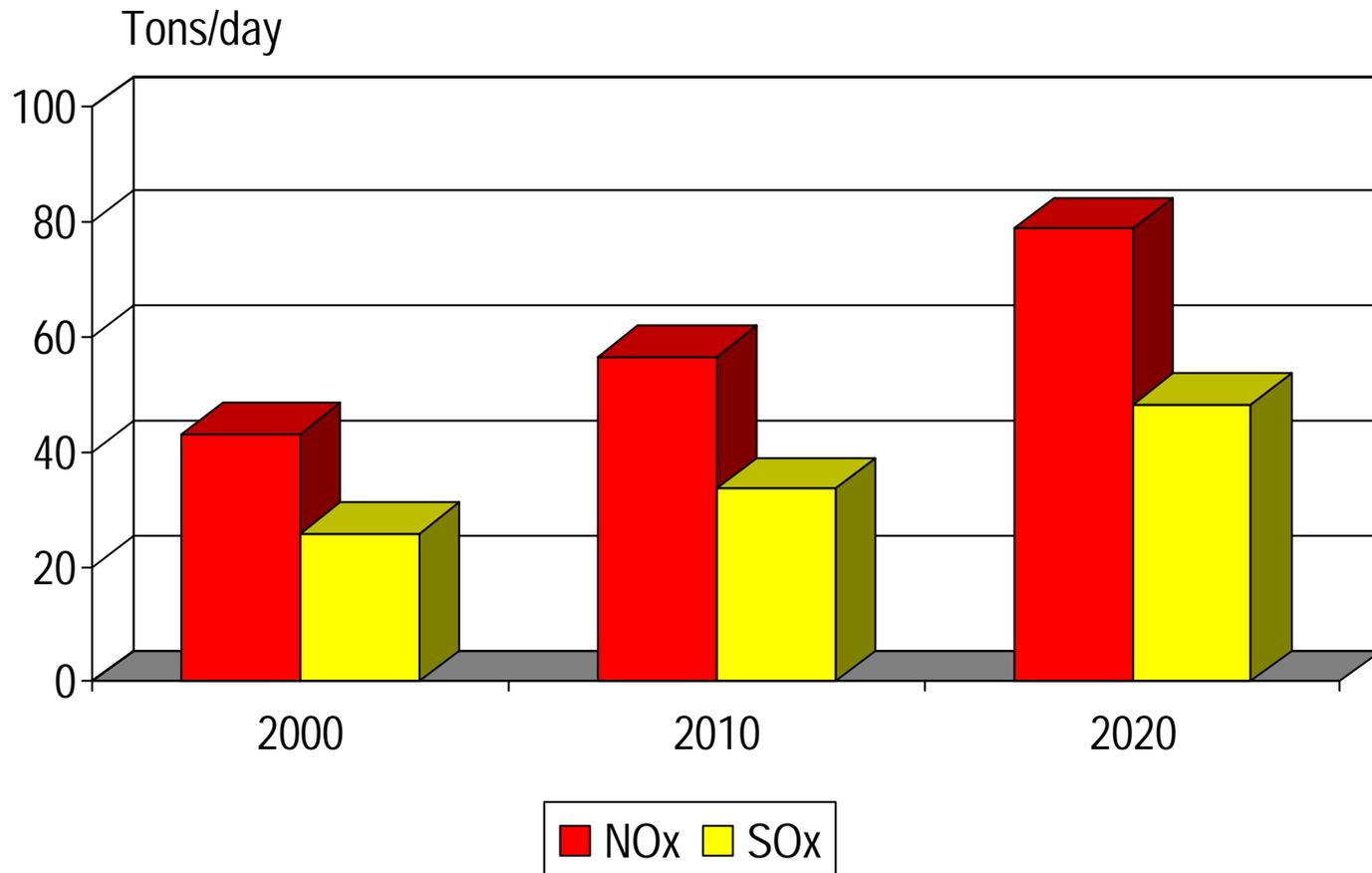
NO<sub>x</sub>

101 TPD Total

# SO<sub>x</sub> Emissions in the South Coast Air Basin



# NOx Emissions from Marine Vessels



# Emission Sources at Ports: Cargo Handling Equipment

- Yard trucks,  
RTG cranes,  
side picks and  
top picks,  
forklifts, etc.



# Emission Sources at Ports: Land-Based Cargo Transportation

- Heavy-duty diesel trucks
- Locomotives

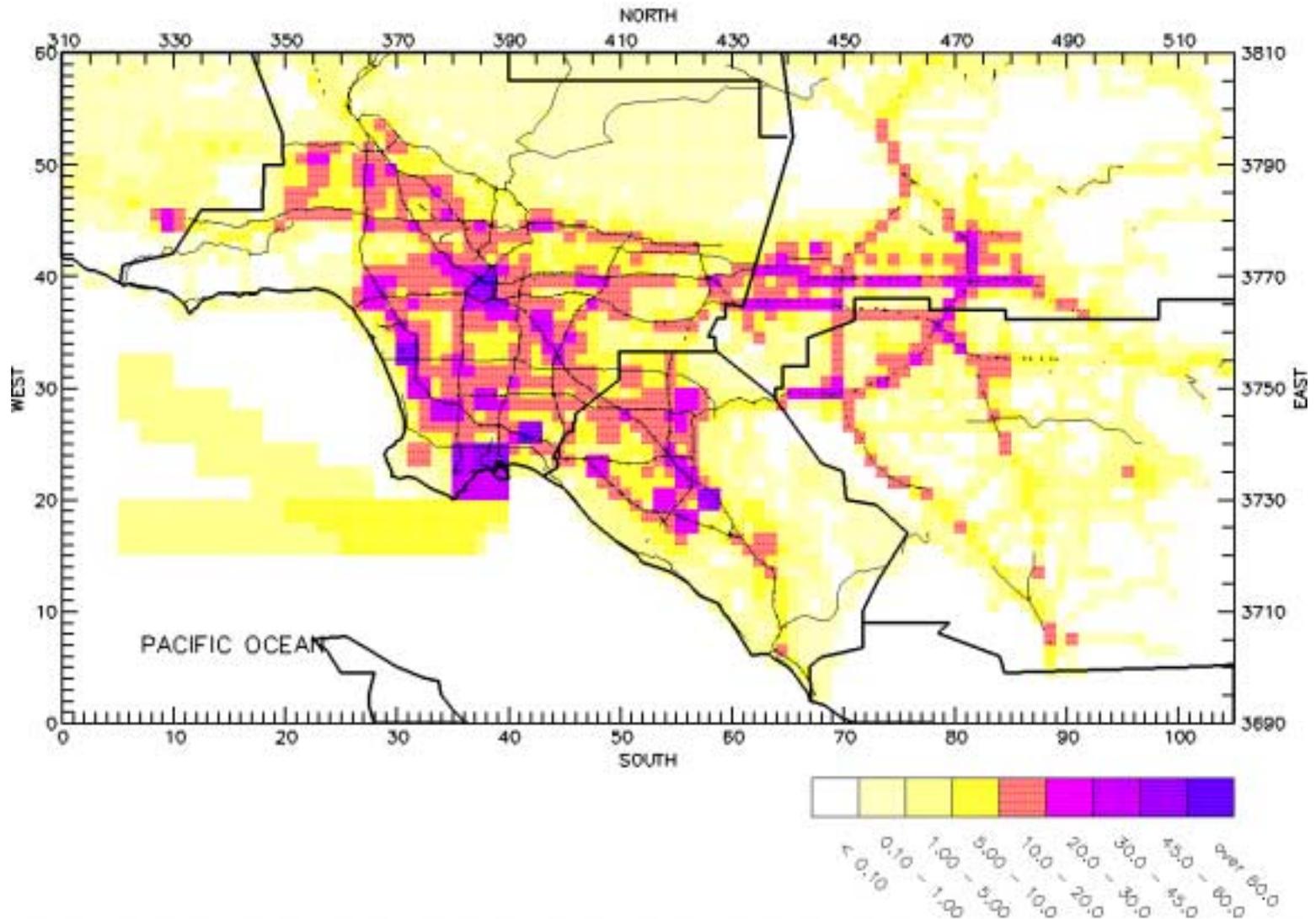


# Emission Sources at Ports: Miscellaneous

- Storage/Processing/Packaging of raw materials (fuel handling and storage, dust from raw materials)
- Diesel transport refrigeration units and generators
- Light-duty vehicles



# Diesel Emissions in the South Coast Air Basin



# Diesel Emissions and Air Quality

- Disproportionate Contribution to NO<sub>x</sub>, PM<sub>10</sub>/PM<sub>2.5</sub>, and Toxic Emissions
- Special Challenge of Lengthy Fleet Turnover



# Efforts to Reduce Emissions at Marine Ports



# Existing Strategies for Marine Vessels

- New Engines
  - IMO standards
  - National regulation
- In-Use Engines
  - Carl Moyer Program
  - NOx and PM Emission Reduction Program
  - Local district programs
  - Voluntary speed reduction MOU

# Voluntary Speed Reduction MOU

- Applies to Ocean-Going Ships
- Voluntarily Reduce Speed to 12 knots within 20 miles of the Ports of Los Angeles/Long Beach
- NOx Emissions Reduced by 2 - 4 tpd in the South Coast with full compliance

# Proposed Future Strategies to Reduce Emissions at Marine Ports



# California Clean Air Plan Proposal

- Control Measure Proposals to Reduce Emissions from All Sources
- Measures Proposed for Marine-Related Activities:
  - Marine Vessels
  - Landside Activities
- Draft Plan to be Released 1st Quarter 2002
- Draft Plan Will be Available on Website:  
[www.arb.ca.gov](http://www.arb.ca.gov)

# California Clean Air Plan

## Proposed Measures for Marine Vessels

- Revised National/International New Engine Standards
- In-Use Emissions from Harbor Craft
- In-Use Emissions from Oceangoing Ships
- Advanced Technology and Innovative Strategies
- Further Emission Reductions at Marine Ports

# Navy Pilot Retrofit Program

- In Process of Co-funding Program With U.S. Navy, U.S. DOE, and U.S. EPA
- Program Will Evaluate Several Potential Retrofit Control Technologies
- Research Will Help Focus on Technologies That Could Be Used on Harbor Craft

# Add-on Control Equipment

- Use of Add-On Exhaust Treatment Technologies to Reduce In-Use Emissions
- Water Injection
- Potential for Large Diesel PM and NO<sub>x</sub> Emission Reductions

# Use of Cleaner Fuels in California Coastal Waters

- Lower Sulfur Fuel; Alternative Fuels
- Sweden Provides Economic Incentives to Ships Using Lower Sulfur Fuel in Their Ports
- Clean Air Plan Mid-term Measure, Implementation 2005-2010

# Advanced Technologies and Innovative Strategies

- Both Harbor Craft and Oceangoing
- Fuel Cells/Solar Power
- Cold Ironing
- Operational Controls
- Long-term, post-2010
- Local, State, and National Collaboration

# Other Approaches

## Operational Controls

- Limit Idling
- Clean Tugs Pull Oceangoing Ships in California Coastal Waters
- Limit Vessel Speeds

# California Clean Air Plan

## Proposed Incentive Program Measure

- Establish Incentive Program to Encourage Use of Lower Emitting Ocean-going Vessels
- Success More Likely If Implemented Beyond California
- Variety of Options to Be Explored
- Mid-term Measure,  
Implementation 2005-2010

# Existing Funded Projects

- Marine Vessels

- Number of Vessels: 130
- Funded Level: \$19.5 M
- Emission Reduction: 1389 tpy - NOx  
55 tpy - PM

- Landside Equipment

- Number of Equipment: 110
- Funding Level: \$2.7 M
- Emission Reduction: 164 tpy - NOx  
10 tpy - PM

# SCAQMD Regulatory Programs



# SCAQMD Technical Area Priorities

- Diesel Alternatives - Clean Alternative Fuels in Heavy-Duty Engine Applications
- Electric and Hybrid Electric Technologies
- Off-Road Applications of Alternative Fuels
- Fuel Cells for Transportation and Stationary Applications
- VOC Reduction Technologies for Stationary Sources

# SCAQMD Air Toxics Plan



- Ten Year Comprehensive Road Map
- Additional Controls Beyond AQMP
  - Early Action (4)
  - Stationary Sources (9)
  - Mobile Sources (13)



# SCAQMD Air Toxic Control Plan - Mobile Source Strategies

- Fuel Specification
- After-treatment Technologies
- Engine Design Modifications
- Alternatively-Fueled Vehicles
- Goods Movement
- Engine Idling Time Reduction
- Locomotives
- Locomotive Idling



# SCAQMD Air Toxic Control Plan - Mobile Source Strategies

- Commercial Motorboats, Ships, and Tugs
- Airport Emissions
- Aviation Gasoline (lead)
- Off-Road Utility and Mobile Equipment
- Catalysts for Gasoline Powered Vehicles

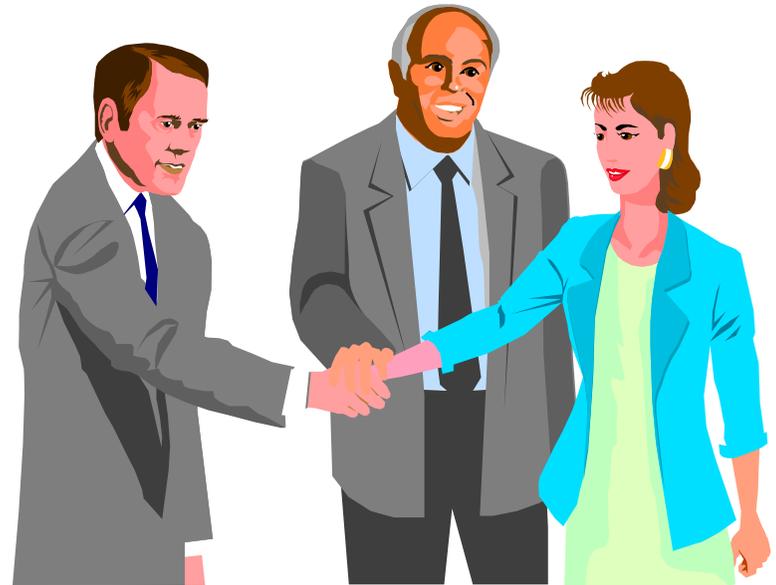


# Challenges to Attainment/ Reducing Air Toxic Levels

- Long Life of Existing Diesel Engines
- Development of Future Control Measures to Meet New Federal/State Clean Air Goals
- International/National versus Local Needs
- Funding to Implement New Technologies

# Road to Success

- Working Together  
(Public/Private Partnerships)
- Consultative Process
- Public Outreach/ Education
- Secure Long-Term Funding  
Assistance for Cleaner  
Technologies



**FROM SMOG TO FOG.  
DAILY.**

**NONSTOP TO LONDON**

**AIR NEW ZEALAND**

